

Claims

1. ~~In a phased array, phase-amplitude monopulse~~
radar antenna arrangement, a radar subsystem
comprising:

5 a phased array antenna including a plurality of
radiating elements in phased-relationship to one
another and disposed in substantially horizontal rows
defining a surface contour and a boresight orthogonal
to a central region of said surface contour, said
10 antenna defining separate regions for generating
corresponding separate beams of radiation, said
separate regions being vertically separated with
respect to one another into upper and lower regions,
said beams being horizontally skewed left and right
15 from the boresight line;

feed means for coupling a predetermined
illumination pattern to said phased array antenna,
said feed means including sum and difference feed
means for coupling respective sum and difference
20 monopulse information from said antenna to a signal
processing means for interpreting radar return
signals; and

a plurality of phase shift means for
controllably modifying the phase of electromagnetic
25 energy coupled between said feed means and said
phased array antenna;

a
said upper and lower regions of said
phased array antenna being ^{physically} set in oppositely disposed
directions, whereby said monopulse information
30 provided to said signal processing means provides a
basis for developing target indications with respect
to elevation angle and azimuth.

2. ~~The method of establishing a phased array, phase-amplitude monopulse radar antenna arrangement including a radar subsystem, said method comprising the steps of:~~

- 5 (a) placing a plurality of electromagnetically radiating elements in phased-relationship to one another to establish a phased array antenna, said radiating elements being disposed in substantially horizontal rows defining a surface contour and a
10 boresight orthogonal to a central region of said surface contour, said antenna defining separate regions for generating corresponding separate beams of radiation, said separate regions being vertically separated with respect to one another into upper and
15 lower regions, said beams being horizontally skewed left and right from the boresight line;
- (b) coupling a feed means to said phased array antenna for applying a predetermined electromagnetic illumination pattern to said phased array antenna,
20 said feed means including sum and difference feed means for carrying respective sum and difference monopulse information from said antenna to a signal processing means for interpreting radar return signals;
- 25 (c) interposing between said feed means and said phased array antenna, a plurality of phase shift means for controllably modifying the phase of electromagnetic energy coupled between said feed
~~means and said phased array antenna;~~

(d) disposing said upper and lower regions of
said phased array antenna in ^{physically} oppositely disposed
directions, whereby said monopulse information
provided to said signal processing means provides a
5 basis for developing target indications with respect
to elevation angle and azimuth.

3. The invention of claims 1 or 2, wherein said
feed means includes a plurality of coupling means for
directionally coupling electromagnetic energy with
10 respect to each of said horizontal rows of radiating
elements, each of said coupling means being effective
for communicating electromagnetically with each of
said sum and difference feed means.

4. The invention of claims 1, 2 or 3, wherein each
15 of said plurality of phase shift means is effective
for controllably modifying the phase of
electromagnetic energy coupled between said feed
means and a single one of said horizontal rows of
radiating elements.

20 5. The invention of claims 1 or 2, wherein said
radar subsystem further comprises a signal processing
~~means for interpreting radar return signals.~~